

**Amendments To The Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1. (Original): A matching network for coupling an RF power supply to an RF antenna in a plasma generator, comprising:

a resonantly tunable circuit formed of a variable capacitor and inductor in a series resonance configuration;

a ferrite core transformer coupled to the resonantly tunable circuit.

2. (Original): The matching network of Claim 1 wherein the transformer comprises a secondary winding which couples the transformer to the tunable circuit and a primary winding.

3. (Currently Amended): A The matching network of Claim 2 for coupling an RF power supply to an RF antenna in a plasma generator, comprising:

a resonantly tunable circuit formed of a variable capacitor and an inductor in a series resonance configuration:

a ferrite core transformer coupled to the resonantly tunable circuit,

wherein a the secondary winding of the transformer is a single-turn winding and a the primary winding of the transformer is a multi-turn winding, the secondary winding is coupled to the tunable circuit.

4. (Previously Presented): A matching network for coupling an RF power supply to an RF antenna in a plasma generator, comprising:

a resonantly tunable circuit formed of a variable capacitor and an inductor in a series resonance configuration;

a ferrite core transformer having a single-turn secondary winding and a multi-turn

primary winding, and the resonantly tunable circuit being connected to the secondary winding,  
wherein the transformer further comprises a core which is made of a plurality of  
ferrite cores.

5. (Previously Presented): A matching network for coupling an RF power supply to an  
RF antenna in a plasma generator, comprising:

a resonantly tunable circuit formed of a variable capacitor and an inductor in a  
series resonance configuration;

a ferrite core transformer having a secondary winding that couples the transformer  
to the resonantly tunable circuit, and also having a primary winding,

wherein the transformer further comprises a core which is made of a plurality of  
ferrite cores.

6. (Original): The matching network of Claim 2 wherein the turn ratio between the  
primary winding and the secondary winding ranges from 3:1 to 8:1.

7. (Original): The matching network of Claim 6 wherein the turn ratio between the  
primary winding and the secondary winding is selected to transform the plasma impedance of the  
plasma generator to  $50\Omega$ .

8. (Previously Presented): A matching network for coupling an RF power supply to an  
RF antenna in a plasma generator, comprising:

a resonantly tunable circuit formed of a variable capacitor and an inductor in a  
series resonance configuration;

a ferrite core transformer having a secondary winding that couples the transformer  
to the resonantly tunable circuit, and also having a primary winding,

wherein the turn ratio between the primary winding and the secondary winding

ranges from 3:1 to 8:1, and the transformer comprises a core made of 12 ferrite cores with a 1.25 inch OD and 0.75 inch ID, made of M-type ferrite.

9. (Original): The matching network of Claim 8 wherein the variable capacitor has a capacity range of 5-125pF.

10. (Original): The matching network of Claim 9 wherein the network fits within a cylindrical volume 6 inches in diameter and 8 inches long.

11. (Original): The matching network of Claim 1 further comprising an RF power supply connected through a 50  $\Omega$  coaxial cable to an input of the matching network and RF antenna (inductive coil) connected to an output of the matching network.

12. (Original): A plasma ion or electron source, comprising:

- an RF power supply;
- a coaxial cable connected to the RF power supply;
- a matching network having an input connected to the coaxial cable, the matching network comprising:
  - a resonantly tunable circuit formed of variable capacitor and an inductor in a series resonance configuration;
  - a ferrite core transformer coupled to the resonantly tunable circuit;
  - an RF antenna connected to an output of the matching network;
  - a plasma ion or electron generator having the RF antenna mounted therein for inductively generating a plasma.

13. (Original): The plasma ion or electron source of Claim 12 wherein the transformer comprises a secondary winding which couples the transformer to the tunable circuit and a primary winding.

14. (Currently Amended): A The plasma ion or electron source of Claim 13,  
comprising:  
an RF power supply;  
a coaxial cable connected to the RF power supply;  
a matching network having an input connected to the coaxial cable, the matching  
network comprising:  
a resonantly tunable circuit formed of a variable capacitor and an inductor in a  
series resonance configuration;  
a ferrite core transformer coupled to the resonantly tunable circuit;  
an RF antenna connected to an output of the matching network; and,  
a plasma ion or electron generator having the RF antenna mounted therein for  
inductively generating a plasma,  
wherein the a secondary winding of the transformer is a single-turn winding and  
the a primary winding of the transformer is a multi-turn winding, and the secondary winding  
couples the transformer to the resonantly tunable circuit.

15. (Currently Amended): A plasma ion or electron source,  
comprising:  
an RF power supply;  
a coaxial cable connected to the RF power supply;  
a matching network having an input connected to the coaxial cable, the matching  
network comprising:  
a resonantly tunable circuit formed of a variable capacitor and an inductor in a  
series resonance configuration; and,

a ferrite core transformer having a single-turn secondary winding and a multi-turn primary winding, and the resonantly tunable circuit being connected to the secondary winding;

wherein there ~~are~~ is an RF antenna connected to an output of the matching network; and,

a plasma ion or electron generator having the RF antenna mounted therein for inductively generating a plasma; and,

wherein the transformer further comprises a core which is made of a plurality of ferrite cores.

16. (Original): The plasma ion or electron source of Claim 14 wherein the turn ratio between the primary winding and the secondary winding ranges from 3:1 to 8:1.

17. (Currently Amended): The plasma ion or electron source of Claim 14 wherein the coaxial cable has an impedance of 50  $\Omega$  and the turn ratio between the primary winding and the secondary winding is selected to transform the plasma impedance of the plasma generator to 50  $\Omega$ .

18. (Currently Amended): A plasma ion electron source comprising:  
an RF power supply;  
a coaxial cable connected to the RF power supply;  
a matching network having an input connected to the coaxial cable, the matching network comprising:

a resonantly tunable circuit formed of a variable capacitor and an inductor in a series resonance configuration; and,

a ferrite core transformer coupled to the resonantly tunable circuit,

wherein there ~~are~~ is an RF antenna connected to an output of the matching

network; and,

a plasma ion or electron generator having the RF antenna mounted therein for inductively generating a plasma; and,

wherein the plasma ion or electron generator is a multicusp plasma generator.

19. (Original): The plasma ion or electron source of Claim 18 wherein the source is a part of a compact focused ion beam system.

20. (Original): The plasma ion or electron source of Claim 19 wherein the matching network fits within a cylindrical cavity 6 inches in diameter and 8 inches long.

21. (Previously Presented): A plasma ion or electron source, comprising:

- an RF power supply;
- a coaxial cable connected to the RF power supply;
- a matching network having an input connected to the coaxial cable, the matching network comprising;
- a resonantly tunable circuit formed of a variable capacitor and an inductor in a series resonance configuration;
- a ferrite core transformer coupled to the resonantly tunable circuit;
- an RF antenna connected to an output of the matching network; and,
- a plasma ion or electron generator having the RF antenna mounted therein for inductively generating a plasma,

wherein the transformer comprises both a single-turn secondary winding that couples the transformer to the tunable circuit and a multi-turn primary winding, and the transformer further comprises a core that is made of a plurality of ferrite cores.

22. ((Previously Presented): A plasma ion or electron source, comprising:
- an RF power supply;
  - a coaxial cable connected to the RF power supply;
  - a matching network having an input connected to the coaxial cable, the matching network comprising:
    - a resonantly tunable circuit formed of a variable capacitor and an inductor in a series resonance configuration;
    - a ferrite core transformer coupled to the resonantly tunable circuit;
    - an RF antenna connected to an output of the matching network; and,
    - a plasma ion or electron generator having the RF antenna mounted therein for inductively generating a plasma,
  - wherein the plasma ion or electron generator is a multicusp plasma generator.
23. (Previously Presented): The plasma ion or electron source of Claim 22 wherein the source is a part of a compact focused ion beam system.
24. ((Previously Presented): The plasma ion or electron source of Claim 23 wherein the matching network fits within a cylindrical cavity 6 inches in diameter and 8 inches long.